

1                   Amendment to the Claims

2                   In the Claims:

3                   Please cancel Claim 59.

4                   Please amend Claims 34, 39, 42, 50, 54, 56, 60 and 61, as follows:

5                   Claims 1-33 (Previously Canceled)

6                   34. (Currently Amended) A method for detecting a feature using an imaging system, where  
7                   the feature is part of an object and the feature can be labeled, comprising the steps of:

8                   (a) labeling the feature such that a plurality of different optical signaling  
9                   components become bound to said feature, probes suitable for so labeling the feature comprising:

10                   (i) a single type of probe comprising a binding element that selectively  
11                   binds to at least a portion of the feature, and a plurality of optical signaling components, at least two  
12                   of which are different, thereby enabling the plurality of different optical signaling components to be  
13                   bound to said feature; and

14                   (ii) two different types of probes, each of which comprises a binding  
15                   element that selectively binds to at least a portion of the feature, and at least one optical signaling  
16                   component, such that the optical signaling components of the two different types of probes are not  
17                   identical, thereby enabling the plurality of different optical signaling components to be bound to said  
18                   feature;

19                   (b) collecting light from said object along a collection path, the light that is collected  
20                   comprising light corresponding to each of the plurality of different optical signaling components that has  
21                   been simultaneously collected;

22                   (c) dispersing the light that is traveling along the collection path into a plurality of  
23                   light beams, as a function of a plurality of different discriminable characteristics of the light;

24                   (d) focusing each of the plurality of light beams onto a single detector having sufficient  
25                   pixels to enable a plurality of images to be simultaneously detected, to produce a respective image  
26                   corresponding to that light beam, thereby simultaneously generating a plurality of images, locations of  
27                   probes bound to said feature included in the plurality of images being optically discriminated, such that  
28                   each of the plurality of images are generated on the single detector;

29                   (e) detecting the plurality of images to produce a signal indicative of each optical  
30                   signaling component, such that a different signal is produced for each of the plurality of images; and

(f) analyzing each different signal produced for each of the plurality of images to determine if indicative spectral signals produced by the plurality of different optical signaling components are present, thereby establishing that the feature is part of the object.

35. (Previously Presented) The method of Claim 34, wherein the step of labeling the feature comprises the step of exposing said object to the single type of probe, thereby binding said plurality of optical signaling components of the single type of probe to said feature.

36. (Previously Canceled)

37. (Previously Presented) The method of Claim 34, wherein the step of analyzing each different signal produced for each of the plurality of images comprises the step of determining if an intensity of a waveband of light indicative of said plurality of different optical signaling components is present in that image.

38. (Previously Presented) The method of Claim 34, wherein said object comprises a biological cell, and said feature comprises a cellular component.

39. (Currently Amended) The method of Claim 34, wherein the step of analyzing each different signal produced for each of the plurality of images comprises the step of determining if a multiplex of a spectral signature for each of the plurality of different optical signaling components is present in that image, such that the following spectral signatures can be differentiated, where A corresponds to a first optical signaling component, and B corresponds to a second optical signal component, where light defining all such spectral signatures has been simultaneously collected:

- (a) a spectral signature comprising A-A-A-B;
- (b) a spectral signature comprising A-A-B-B; and
- (c) a spectral signature comprising A-B-B-B.

40. (Previously Presented) The method of Claim 34, wherein the step of labeling the feature comprises the step of exposing said object to the two different types of probes, thereby binding the plurality of different optical signaling components of the two different types of probes to said feature.

41. (Previously Canceled)

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1                   42. (Currently Amended) A method for probing an object with probes to detect if any of a  
2 plurality of specific features are part of the object, using an imaging system, wherein such probes can  
3 be attached to each such feature, the method comprising the steps of:

4                   (a) for each specific feature to be detected, providing each type of probe required  
5 to uniquely label each specific feature that is part of the object, types of probes suitable for so  
6 labeling each specific feature comprising:

7                   (i) one type of probe including a binding element that selectively binds to  
8 the feature, and a plurality of optical signaling components, at least two of which are different,  
9 thereby enabling the plurality of different optical signaling components to be bound to said feature;  
10 and

11                   (ii) two different types of probes, each of which includes a binding element  
12 that selectively binds to at least a portion of the feature, and at least one optical signaling component,  
13 such that the optical signaling components of the two different types of probes are not identical,  
14 thereby enabling the plurality of different optical signaling components to be bound to said feature;

15                   (b) exposing said object to each type of probe required to uniquely label each  
16 specific feature that is part of the object;

17                   (c) collecting light from said object along a collection path, the light that is collected  
18 comprising light corresponding to each optical signaling component used to label the plurality of specific  
19 features that are part of the object, such light having been simultaneously collected;

20                   (d) dispersing the light that is traveling along the collection path into a plurality of  
21 light beams, as a function of a plurality of different discriminable characteristics of the light;

22                   (e) focusing each of the plurality of light beams onto a different portion of a single  
23 detector, to produce a respective image corresponding to that light beam, thereby simultaneously generating  
24 a plurality of images on the single detector, locations of probes bound to said feature included in the  
25 plurality of images being optically discriminated;

26                   (f) detecting the plurality of images to produce a signal indicative of each optical  
27 signaling component present in the plurality of images and used to uniquely label each specific  
28 feature that is part of the object, such that a different signal is produced for each of the plurality of  
29 images; and

(g) analyzing the signals produced for each of the plurality of images to determine which specific feature is part of the object.

43. (Previously Presented) The method of Claim 42, wherein at least one specific feature to be detected is labeled with the one type of probe including the plurality of optical signaling components.

44. (Previously Presented) The method of Claim 42, wherein said object comprises a biological cell, and each feature comprises a cellular component.

45. (Previously Canceled)

46. (Previously Presented) The method Claim 42, wherein at least one specific feature to be detected is labeled with the two different types of probes including the optical signaling components that are not identical.

47. (Previously Canceled)

48. (Previously Canceled)

49. (Previously Presented) The method of Claim 42, wherein each optical signaling component comprises a fluorescent dye, further comprising the step of directing sufficient energy toward said object, such that the fluorescent dye is excited to emit a fluorescent light comprising a uniquely discriminable characteristic of the optical signaling component.

50. (Currently Amended) The method of Claim 42, wherein ~~at least one specific feature is uniquely discriminable based on an intensity of multiplexed light from a plurality of optical signaling components bound to that feature~~ the step of analyzing each different signal produced for each of the plurality of images comprises the step of determining if a multiplex of a spectral signature for each of the plurality of different optical signaling components is present in that image, such that the following spectral signatures can be differentiated, where A corresponds to a first optical signaling component, and B corresponds to a second optical signal component, where light defining all such spectral signatures has been simultaneously collected:

(a) a spectral signature comprising A-A-A-B

(b) a spectral signature comprising A-A-B-B; and

(c) a spectral signature comprising A-B-B-B.

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1       51. (Previously Presented) The method of Claim 42, wherein at least one specific feature is  
2 uniquely discriminable based on a spectral composition of light from a plurality of optical signaling  
3 components bound to that at least one specific feature.

4       52. (Previously Canceled)

5       53. (Previously Canceled)

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1                   54. (Currently Amended) A method for detecting a feature using an imaging system, where  
2 the feature is part of an object and the feature can be uniquely labeled, comprising the steps of:

3                   (a) labeling the feature such that a plurality of different optical signaling  
4 components become bound to said feature, types of probes suitable for so labeling each specific  
5 feature comprising:

6                   (i) a single type of probe including a binding element that selectively binds  
7 to the feature, and a plurality of optical signaling components, at least two of which are different,  
8 thereby enabling the plurality of different optical signaling components to be bound to said feature;  
9 and

10                   (ii) two different types of probes, each of which includes a binding element  
11 that selectively binds to at least a portion of the feature, and at least one optical signaling component,  
12 such that the optical signaling components of the two different types of probes are not identical,  
13 thereby enabling the plurality of different optical signaling components to be bound to said feature;

14                   (b) collecting light from said object along a collection path, while there is relative  
15 motion between the object and an apparatus employed to collect the light, the light that is collected  
16 comprising light corresponding to each of the plurality of different optical signaling components that has  
17 been simultaneously collected, such that the collection path is substantially orthogonal to an axis of the  
18 relative motion, a field angle in object space along the collection path being sufficiently small so as to  
19 enable light collected from the object to be spectrally dispersed onto a single detector;

20                   (c) dispersing the light that is traveling along the collection path into a plurality of  
21 light beams, as a function of a plurality of different discriminable characteristics of the light;

22                   (d) focusing each of the plurality of light beams to produce a respective image  
23 corresponding to that light beam on the single detector, thereby simultaneously generating a plurality of  
24 images on the single detector;

25                   (e) detecting the plurality of images to produce a signal indicative of each optical  
26 signaling component, such that a different signal is produced for each of the plurality of images; and

27                   (f) analyzing each different signal to determine if a spectral component due to each  
28 optical signaling component bound to said feature is present in the image, thereby establishing that said  
29 feature is part of the object.

30                   55. (Cancelled)

1       56. (Currently Amended) A method for detecting a feature using an imaging system, where  
2 the feature is part of an object and the feature can be uniquely labeled, comprising the steps of:

3           (a) labeling the feature such that a plurality of different optical signaling  
4 components become bound to said feature;

5           (b) collecting light from said object along a collection path, while there is relative  
6 motion between the object and an apparatus employed to collect the light, the light that is collected  
7 comprising light corresponding to each of the plurality of different optical signaling components and being  
8 simultaneously collected;

9           (c) dispersing the light that is traveling along the collection path into a plurality of  
10 light beams, such that light from different optical signaling components is included in different ones of  
11 plurality of light beams;

12           (d) focusing each of the plurality of light beams onto a different portion of a single  
13 detector to produce a respective image corresponding to that light beam, thereby simultaneously generating  
14 a plurality of images on the single detector;

15           (e) detecting the plurality of images to produce a signal indicative of each optical  
16 signaling component, such that a different signal is produced for each of the plurality of images; and

17           (f) analyzing each different signal produced for each of the plurality of images to  
18 determine if indicative spectral signals produced by the plurality of different optical signaling  
19 components are present, thereby establishing that the feature is part of the object.

20       57. (Previously Presented) The method of Claim 56, wherein the step of labeling the feature  
21 such that a plurality of different optical signaling components become bound to said feature  
22 comprises the step of exposing the object to a single type of probe comprising a binding element that  
23 selectively binds to at least a portion of the feature, and a plurality of optical signaling components, at  
24 least two of which are different, thereby enabling the plurality of different optical signaling  
25 components to be bound to said feature.

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1       58. (Previously Presented) The method of Claim 56, wherein the step of labeling the feature  
2 such that a plurality of different optical signaling components become bound to said feature  
3 comprises the step of exposing the object to two different types of probes, each of which comprises a  
4 binding element that selectively binds to at least a portion of the feature, and at least one optical  
5 signaling component, such that the optical signaling components of the two different types of probes  
6 are not identical, thereby enabling the plurality of different optical signaling components to be bound  
7 to said feature.

8       59. (Canceled)

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1                   60. (Currently Amended) A method for probing an object with probes to detect if any of a  
2 plurality of specific features are part of the object, using an imaging system, wherein such probes can  
3 be attached to each such specific feature, the method comprising the steps of:

4                   (a) for each specific feature to be detected, providing each type of probe required  
5 to uniquely label each specific feature that is part of the object, types of probes suitable for so  
6 labeling each specific feature comprising:

7                   (i) plural signaling probes, each plural signaling probe comprising a  
8 binding element that selectively binds to at least a portion of said specific feature, and a plurality of  
9 optical signaling components, at least two of which are different, thereby enabling a plurality of  
10 different optical signaling components to be bound to said specific feature if said specific feature is  
11 part of the object; and

12                   (ii) mono signaling probes, each mono signaling probe comprising a  
13 binding element that selectively binds to at least a portion of said specific feature, and one optical  
14 signaling component, such that two different types of mono signaling probes, each different type  
15 including a different optical signaling component, are needed to enable a plurality of different optical  
16 signaling components to be bound to said specific feature if said specific feature is part of the object;

17                   (b) exposing said object to each type of probe required to uniquely label each  
18 specific feature that is part of the object;

19                   (c) collecting light from said object along a collection path, the light that is collected  
20 comprising light corresponding to each optical signaling component used to label the plurality of specific  
21 features that are part of the object, such light having been simultaneously collected;

22                   (d) dispersing the light that is traveling along the collection path into a plurality of  
23 light beams, as a function of a plurality of different discriminable characteristics of the light;

24                   (e) focusing each of the plurality of light beams onto a different portion of a single  
25 detector, to produce a respective image corresponding to that light beam, thereby simultaneously generating  
26 a plurality of images on the single detector, locations of probes bound to said feature included in the  
27 plurality of images being optically discriminated;

28                   (f) detecting the plurality of images to produce a signal indicative of each optical  
29 signaling component present in the plurality of images and used to uniquely label each specific  
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1 feature that is part of the object, such that a different signal is produced for each of the plurality of  
2 images; and

3 (g) analyzing the signals produced for each of the plurality of images to determine  
4 which specific feature is part of the object.

5 61. (Currently Amended) A method for detecting a feature using an imaging system, where  
6 the feature is part of an object and the feature can be uniquely labeled, comprising the steps of:

7 (a) labeling the feature such that a plurality of different optical signaling  
8 components become bound to said feature, the feature being labeled using either:

9 (i) one type of probe including a binding element that selectively binds to  
10 the feature, and a plurality of optical signaling components, at least two of which are different,  
11 thereby enabling the plurality of different optical signaling components to be bound to said feature; or

12 (ii) two different types of probes, each of which includes a binding element  
13 that selectively binds to at least a portion of the feature, and at least one optical signaling component,  
14 such that the optical signaling components of the two different types of probes are not identical,  
15 thereby enabling the plurality of different optical signaling components to be bound to said feature;

16 (b) collecting light from said object along a collection path, while there is relative  
17 motion between the object and an apparatus employed to collect the light, the light that is collected  
18 comprising light corresponding to each of the plurality of different optical signaling components that has  
19 been simultaneously collected;

20 (c) dispersing the light that is traveling along the collection path into a plurality of  
21 light beams, as a function of a plurality of different discriminable characteristics of the light;

22 (d) focusing each of the plurality of light beams onto a different portion of a single  
23 detector to produce a respective image corresponding to that light beam, thereby simultaneously generating  
24 a plurality of images on the single detector;

25 (e) detecting the plurality of images to produce a signal indicative of each optical  
26 signaling component, such that a different signal is produced for each of the plurality of images; and

27 (f) analyzing each different signal to determine if a spectral component due to each  
28 optical signaling component bound to said feature is present in the image, thereby establishing that said  
29 feature is part of the object.